essay by Mr. A. L. Kroeber in the *American Anthropologist* (N.S., vol. iii. 1901, p. 308). In all the examples referred to by the author there is, as there is practically everywhere else, a well-developed symbolism and a conventional decoration, which exist not side by side but in each other. Most primitive decoration, no matter how geometric or simple, has significance, and thus is, visually or ideographically, realistic. This fusion of two differing tendencies (symbolism and decoration) is a rule practically without exceptions. It is universal, because it is necessary. At times, as in European civilisation, the two tendencies become more separated, but the more primitive a people is, the more intimately fused in its art will these two tendencies be. Other tendencies also are still combined with these two in a sufficiently early and rude condition of society. The symbolism of the Arapaho is as ideographic as it is realistic, and is as much a primitive method of writing as it is of artistic representation. The author argues that it is incorrect to assume that symbolism, or any other single motive, accounts for the origin of a design. Thus we come to the conclusion that all search for origins in anthropology can lead to nothing but wrong results. The tendencies referred to are at the root of all anthropological phenomena. Therefore it is these general tendencies, more properly than the supposed causes of detached phenomena, that should be the aim of investigation.

THE additions to the Zoological Society's Gardens during the past week include a Black Kite (*Milvus migrans*), European, presented by Mr. J. B. Thornhill; a Diana Monkey (*Cercopithecus diana*) from West Africa, a Yellowish Capuchin (*Cebus flavescens*) from South America, a Fournier's Capromys (*Capromys pilorides*) from Cuba, a Small-clawed Otter (*Lutra leptonyx*), two Bungoma River Turtle (*Emyda granosa*), a Ring-necked Parrakeet (*Palaeornis torquatus*) from India, a Vulpine Phalanger (*Trichosurus vulpecula*) from Australia, two Yellow-winged Parrakeets (*Brotogerys virescens*) from Brazil, a South Albemarle Tortoise (*Testudo vicina*) from the Galapagos Islands, eight Wrinkled Terrapins (*Chrysemys scripta rugosa*) from the West Indies, a Grey Monitor (*Varanus griseus*) from North Africa, a Razorbill (*Alca torda*), British, deposited; a Grey Squirrel (*Sciurus cinereus*) from North America, a Mouflon (*Ovis musimon*) from Sardinia, a Common Rhea (*Rhea americana*) from South America, purchased; eight Golden Orfe (*Leuciscus idus*) from European fresh waters, purchased.

OUR ASTRONOMICAL COLUMN.

EPHEMERIS OF ENCKE'S COMET (1901 *b*).—Herr Ch. Thonberg gives a further ephemeris for following this comet, in *Astronomische Nachrichten*, Bd. 156, No. 3740.

Ephemeris for 0*h. Berlin Mean Time.*

1901.	R.A.	Decl.
	h. m. s.	° ′
Oct. 10 ...	14 19 46 ...	−20 11·2
12 ...	32 42 ...	21 22·9
14 ...	45 20 ...	22 28·0
16 ...	14 57 42 ...	23 26·9
18 ...	15 9 46 ...	24 19·8
20 ...	21 32 ...	25 7·2
22 ...	33 0 ...	25 49·3
24 ...	44 10 ...	26 26·6
26 ...	15 55 2 ...	26 59·4
28 ...	16 5 35 ...	27 27·9
30 ...	16 15 50 ...	−27 52·5

NEW ALGOL-TYPE VARIABLE, 78 (1901), CYGNI.—Mr. A. Stanley Williams has detected variability in the star, whose approximate position is :—

R.A. = 20h. 18m. 4·0s.
Decl. = + 42° 46′·4 } (1855).

The measures of brightness were made from photographs obtained with a 4·4-inch portrait lens. Normally the star is about 10th magnitude, falling almost to 12th magnitude at mininum. It appears about a magnitude below normal brightness on a photograph taken 1900 October 21, 13h. 0m. to 13h. 50m. G.M.T.; and minima have also been visually determined on the following dates :—

	h.	m.	
1901 Aug. 24	...	14	27 G.M.T.
Sept. 7	...	9	43
,, 14	...	7	29

From these data the elements of the star's variation are :—

Minima = 1901 Sept. 7d. 9h. 43m. + 3d. 10h. 49m. E.

For about 3d. 2h. 19m. the star remains constant at 10·0 magnitude. It then diminishes in 3h. 30m. to 12 magnitude, at which it remains for 50m. Recovery to 10 magnitude occurs in 4h. 10m., the whole change occupying about 8h. 30m. (*Astronomische Nachrichten*, Bd. 156, No. 3740).

PHOTOGRAPH OF THE SPECTRUM OF LIGHTNING.—Prof. Pickering announces that a successful photograph of the spectrum of a lightning flash has been obtained recently at the Harvard College Observatory. The spectrum showed a complicated series of bright lines which have as yet not been individually recognised. No information is at present extant as to the instrument with which this interesting photograph has been taken, but it is to be hoped that the scale is sufficient to ensure accurate determinations of wave-length. For some years back attempts have been made at the Solar Physics Observatory at South Kensington to record the lightning spectrum, using both prisms and gratings in conjunction with short-focus cameras of varying size. Up to the present time, however, no success has been attained, and it is with the greatest interest that the publication of further details from Prof. Pickering will be awaited.

THE ROYAL COLLEGE OF SCIENCE AND THE UNIVERSITY OF LONDON.[1]

I AM sorry to have to sound at the outset a note of sadness. We little thought when the end of the session brought release for us all that before we could meet again death would intervene to prevent one of our number from joining his colleagues and friends at the reassembly. It may not be known to every one present that a deplorable accident has deprived the College of one of the most brilliant and popular of the junior members of the staff. Mr. Martin Woodward, demonstrator of zoology, was the younger son of Dr. Henry Woodward, the eminent keeper of the geological department of the British Museum, who is a personal friend of many of us and respected by everybody. United as father and son were, not only by ties of affection but by constant companionship in their scientific pursuits, we can only guess and I cannot express, the severity of the father's loss. All we can do on this sad occasion is to offer to the family of our departed friend our most heartfelt sympathy. Mr. Woodward entered the College as a student in 1882 and gained the Murchison prize and medal. He was appointed demonstrator by Prof. Huxley in 1885, and has since that time worked under the direction of Prof. Howes. Most of us deplore the loss of a genial, kindly and accomplished friend, but science too is the poorer by this unhappy event, for Woodward was well known as a zoologist, and his extensive knowledge, skill as a manipulator and scientific enthusiasm seemed to promise a high place for him among the biologists of his time.

The next announcement that I am permitted to make is of a more cheerful character. Dr. Stansfield, of the metallurgical division, has been appointed professor of metallurgy in the McGill University, Montreal. All students who have come under Dr. Stansfield's influence will, I believe, gladly unite with his colleagues in wishing him a long, happy and distinguished career in his new home across the sea.

By this time it is probably known to most of the students assembled here that the session now gone has seen the last of two of the most eminent members of the staff as professors in the College. In Sir Norman Lockyer we are losing an investigator of the first rank who may be said to have created a branch of science out of the results of his own researches. But apart from his labours in astronomical physics, I feel that the scientific part of the community owes much to Sir Norman Lockyer for the energy with which he has, on so many occasions, defended the cause of science. Whenever a question has arisen of public opinion or public policy involving the position of science, or of scientific men, he has always sounded the right note. You will, I am sure, join with us his colleagues on the council of the

[1] Address delivered at the opening of the Royal College of Science, October 3, by Prof. W. A. Tilden, F.R.S.

Royal College of Science in offering on this occasion of severing an official link an expression of our earnest wish that he may enjoy many years of health and undiminished strength to carry forward those researches which have made the name of Lockyer famous throughout the civilised world. Prof. Rücker has been called away to occupy the high position of principal of the reconstituted University of London, concerning which I shall say a few words presently. It is difficult to express the profound sense of loss with which I refer to the removal of Prof. Rücker. The members of the College have only the satisfaction of knowing that among their number was found the *only* man who seemed to possess the qualifications requisite for this difficult and arduous position. We also have reason to hope that the association of the College with the University will afford opportunities for the exercise of his friendly cooperation and advice whenever they are required in the work of the College which he has served so long and with so much advantage to all good students.

Days like this are milestones on the road of life for all of us—for you students marking very early stages of the journey—for some of us pretty far advanced toward the end. The metaphor suggests that those of us who have travelled in advance may have something useful to say to those who come after. But I am not going to offer much in the way of advice, because my experience tells me that it will be only very sparingly accepted. After all, the road which you have to follow is not the same, things are altered since *we* passed that way, times are changed, and even if it were not so the spirit of each succeeding generation appears to be unwilling to blend itself with the spirit of the past. The instinct of the young is always to try everything afresh and make up the sum of their own experience, and to regard with suspicion everything which the seniors have to say. But I do not seriously blame them. If it were not thus the world would soon be too wise for happiness, the sense of adventure would no longer brighten the springtime of life which "sicklied o'er with the pale cast of thought would lose the name of action."

Apart from the advice which it is my custom to address to my own class on the conduct of their studies, all I desire to say to the students here can be expressed in a few words. Do not suppose that we seniors are indifferent to your fortunes, to your struggles and successes or failures. On such a day as this we rejoice with those who have reason to rejoice—the winners of prizes and rewards. We would gladly be among you as equals or competitors; we think of our own time and the happiness of something attempted, something done. Go on and prosper. To the newcomers whom we welcome to-day, we wish a like success in the years which are to follow. But it must not be forgotten by them that this demands effort, strenuous and sustained effort. It will not be enough to enter the College every day at a few minutes after ten and leave it at a few minutes before four, and though I do not advise midnight oil, I do venture to say that the chief purpose of the Royal College of Science is not to provide a pleasant kind of club for a few privileged young persons at the expense of the Government or of their own parents and friends.

Aut disce aut discede ought to be written up here as it is in another place.

The third course hinted at on that celebrated notice board is not available here. So you must understand that there are but two alternatives recognised among us—either learn or leave the place.

Independently of the circumstances to which I have already referred as marking in a special way the opening of this present session, there is another subject which must before long assume a position of great importance to us. This College is a recognised school of the new University of London, the majority of the staff are recognised teachers, and those students who choose may become matriculated *internal* students of the University. We cannot yet see clearly to what extent this association will influence our work. We hope for the best; but I think we shall all be agreed that we shall not welcome any changes which will not enable us to live up to the splendid standard of the traditions of our College. Some modifications of detail are, no doubt, from time to time desirable, but we cannot have the standard of attainment and of original work lowered to suit the arrangements of some other institution, however influential.

As it is probable that many of you have not had occasion to consider the subject of the constitution and work of the University, I will venture to submit a few thoughts connected with the subject.

I wonder whether any of you have formed an idea of a university so as to be able to define it. Many people think a university is a place where you may get a degree; a few think it is a place for instruction of a professional or technical kind, still fewer think it is a place for research. An eminent member of the present Government made a speech only a few weeks ago in which at the outset he promised to define a university. In the end, however, he did not supply a definition, but he expressed, certainly very clearly, what in his opinion a university ought to do.

Mr. Chamberlain's view is that a university should do four things—it should teach, it should examine, it should add to knowledge by research, it should show the applications of knowledge. A pretty extensive programme surely!

Cardinal Newman's definition—"A place of *teaching* universal *knowledge*"—does not seem to imply so much, because he almost immediately adds that its object is, *inter alia*, the diffusion and extension of knowledge rather than the advancement. "If, he says, its object were scientific and philosophical discovery, I do not see why a university should have students." ("The Idea of a University," preface).

I will venture a new definition. I should say a university is a place of higher education for those who are qualified by nature to profit by it. And I say that deliberately, holding the opinion as I do that it is not advisable to give more than elementary education to everybody, nor to encourage young people indiscriminately to enter upon a university course. An enormous amount of educational power is now wasted in trying to give a training to intellectual faculties which do not exist, for Providence has not given brains equally to everyone, and many a boy and girl now forced by parents or circumstances to the study of books would be much happier and more useful members of the community if they were taught to lay bricks and to sew and cook and wash, and do these necessary things *well* which are now done badly. This, of course, is not the business of a university, but if the university can so arrange its tests, whether by examination, or in some other way yet to be devised, as to prevent any large number of weaklings from entering upon the university curriculum, it will be doing a kindness to the rejected and a service to the rest of the world.

The new University of London is to be a place of education, we are told, and no longer only a system for testing knowledge got anyhow and anywhere. Its business is to prepare its students for the world. I hold strongly to the view that the *primary* business of a university is not to provide technical instruction from the outset, but to provide those conditions which will help to convert *the boy* into *the man*, and so to prepare him by the cultivation of his faculties that he is then ready to receive instruction in any profession or pursuit which may be marked out for him by his own special gifts or opportunities. All your bachelors, whether in arts or sciences, should be merely well-educated young people with brains. If the programme at school and college has been properly laid out, they cannot have had time to have made much progress in technical work. This does not shut other doors into the professions. A man may become a doctor, a lawyer, an engineer or a chemist without going near the university, but the way through the university must, if things are properly ordered, be always the way chosen by the best students. What I fear is a continuance and increase of the confusion between the processes of education which properly belong to the university and the process of instruction in useful arts or applied science which belongs to the technical school, or, if you please, to the more advanced stages of the university curriculum. Some confusion is inevitable in consequence of the existence from early times in the history of universities of the faculties of theology, law and medicine which are necessarily connected with professions. But in a new university tradition should not be allowed too prominent a place.

In the faculties of engineering and commerce which are to be established it will be disastrous to the cause of higher education if technical practice is to be received as an equivalent for studies which contribute to culture, style and character.

I dissent altogether from the view which seems to be held by some people that the sooner a boy gets to things which will be connected with his future business the better. Doubtless circumstances compel the adoption of this course in some cases, but it is not one which ought to receive the sanction of the university.

The confusion of education with instruction, the mixing of

preparatory with professional studies, also leads to much waste of time. All preparatory studies ought to be over by the age of twenty-one, and in some cases even sooner. A young engineer ought not at that age to be learning the physics and chemistry and mechanics, the principles of which he certainly requires for use, but should be free to work at his engineering and what pertains directly to it.

We may hope that the university will provide such a liberal programme that there may be many avenues to the same degree suitable to the needs and circumstances of different classes of students. By this I mean that there should be a very free choice of languages and sciences; and I should exclude altogether from the early stages of a student's career commercial and technical subjects which, however practically important they may be, should only be taken up after the first degree, B.A. or B.Sc., has been reached, and the time for concentration has come.

As to the entrance or matriculation examination, much difference of opinion exists. But whether a classical language be insisted upon or not, and whether one or more modern languages be required, seem to me to be questions far inferior in importance to the requirement that every student admitted to the university should have been trained as far as he has gone in scientific method. This does not mean that he should be acquainted with any particular branch of science, but that by means of scientific study he should have been taught to use his eyes so as to see things clearly, and should have been made to understand the nature and the right use of evidence in coming to any conclusion. This cannot be done by literary study alone, and if not begun early in life will scarcely be accomplished later on.

An educated man must have not only thoughts, but language by which he may express his thoughts intelligibly and with such brevity or fulness as befits the occasion or the nature of the subject. He *must* speak and write his own language correctly. How much more should be required by the university I have no time to consider now, but I think no man of active mind will be content with translations of the literature or even of the scientific treatises of other countries.

The university is a place of education *primarily*, as I have said; but it should also be a place for research, and I will try to say why.

It is not, I think, the first business of a university to make new knowledge for the sake of the knowledge, but it is indispensable to all systems of advanced instruction that students should be associated with teachers who are daily engaged in the endeavour to penetrate by new ways into the regions which lie beyond the boundaries of existing knowledge. In no other way can the teaching of the university be preserved both fresh and free from error. Moreover, it is impossible to arrest the progress of discovery, which will go on elsewhere, however it may be ignored by the university, and how is it to keep abreast of the knowledge of the day except by taking part in the process of making it? Fortunately, the statutes framed by the commissioners distinctly include among the purposes of the University the promotion of research and the advancement of science and learning. This is a matter which cannot be passed by in silence, because it is one of those questions about which difference of opinion exists even within the senate of the University itself. This is shown by what occurred at the presentation for degrees last May. Lord Rosebery was present on the platform and everybody was very glad to see him, but there is great danger in yielding, as the Vice-Chancellor quite naturally did, to the temptation to invite a distinguished visitor to say a few words on the spur of the moment, unless you are quite certain beforehand as to what he will say. For on being asked to speak, Lord Rosebery expressed the opinion that the University should teach and should have nothing to do with research, which proved to my mind that he had never thought seriously about the question. Nevertheless, this remark was received with evident approval by a considerable part of the audience, and was of course reported fully in all the newspapers.

There are two influences exercised by newspapers which seem to me distinctly mischievous. The one is the diffusion of the idea that mere novelty is a virtue, that things of yesterday are more interesting and important than the things of any day before; and the other is that the utterances of a prominent public man, on any subject whatever, are better worth having than the opinion of the man who has given his whole life to it, and I venture to say that public men are not always cautious enough in what they say on subjects to which they have given no attention, considering the weight attached by the public to all their words.

But as to this question of research in all places of higher instruction, what *a priori* judgment can compare with experience already gained? I am not one of those who willingly refer to Germany, for I am weary of the exaggerated nonsense often talked about German competition and English incompetence. But it is easy to see that the universities of Germany have settled the question for us and all the rest of the world by simply acting on the advice and example of Liebig, to whose influence much of her present prosperity is due.

Newman, as already stated, did not think that scientific or philosophical discovery should be the business of a university, but there is a splendid passage in his famous book, "The Idea of a University," which, though he does not refer to research, I cannot refrain from tearing away from its context, because it supplies such a vivid picture of the benefits which attend the existence of such a university in which the art of research is cultivated. He says: "This I conceive to be the advantage of a seat of universal learning, considered as a place of education. An assemblage of learned men, zealous for their own sciences, and rivals of each other are brought, by familiar intercourse and for the sake of intellectual peace, to adjust together the claims and relations of their respective subjects of investigation. They learn to respect, to consult, to aid each other. Thus is created a pure and clear atmosphere of thought, which the student also breathes, though in his own case he only pursues a few sciences out of the multitude. He profits by an intellectual tradition which is independent of particular teachers, which guides him in his choice of subjects and duly interprets for him those which he chooses. He apprehends the great outlines of knowledge, the principles on which it rests, the scale of its parts, its lights and its shades, its great points and its little, as he otherwise cannot apprehend them. Hence it is that his education is called 'liberal.' A habit of mind is formed which lasts through life, of which the attributes are freedom, equitableness, calmness, moderation and wisdom; or what I have ventured to call a philosophical habit. This, then, I would assign as the special fruit of the education furnished at a university, as contrasted with other places of teaching or modes of teaching. This is the main purpose of a university in its treatment of its students."

This I also humbly believe to be the *primary* purpose of university education, and this kept steadily in view all other things, the making of good doctors, chemists, engineers and merchants will be added thereto. This it is which, I think, will also best satisfy the want so eloquently put forward by Lord Rosebery last November, when, speaking not on the spur of the moment, but deliberately in the character of Lord Rector of the ancient University of Glasgow, he declared that "the first need of our country is a want of men. We want men for all sorts of high positions. We want men who will go anywhere at a moment's notice and do anything." And Lord Rosebery rightly thinks that it is the business of universities to produce such men. Of course it will be asked what has all this to do with the Royal College of Science, which is essentially a technical school for the training of teachers and of mining engineers and metallurgists. The answer is that we have accepted provisionally a place in the new university, and so the future working of the university cannot fail to have a deep interest for us. The nature of the entrance examinations which hereafter we shall be obliged to impose, the extent to which our courses of instruction and our college examinations are to be recognised by the university, the position of our associates in the university, are questions which remain to be considered and settled. And, further, I may add that the character and organisation of the teaching side of the university are subjects which will hereafter seriously influence our feelings towards it and the extent to which we shall be inclined to cast in our lot permanently with the new institution. A great opportunity now opens for the establishment of a seat of learning in the richest and most populous city in the world, richest not only in material wealth, but richest in collections of all that is precious to literature, science and art, richest in magnificent traditions and in memorials of the past. The question is, Will the people of London rise to the level of the great occasion? It concerns them more nearly than anyone else. Is London to fall behind a dozen provincial towns which by the exertions or the munificence of their own citizens afford such splendid evidence of local patriotism? London is no longer one city, but has become lately

a number of adjacent towns. As they cannot well have separate universities, cannot the new municipalities unite in the same spirit which animates the citizens of Edinburgh and Glasgow, Manchester, Birmingham, Leeds and Liverpool, and help to make a real university common to them all?

I cannot hope to exercise much influence on the progress of events, but "out of the fulness of the heart the mouth speaketh," and I trust the views which I have expressed will not prove to be discordant with those of our late colleague, the distinguished Principal of the University, to whom we all look with hope and confidence for help in the solution of the multitudinous and tangled problems which the University of London still presents.

At the conclusion of his address Prof. Tilden distributed the prizes to the successful students.

MATHEMATICS AND PHYSICS AT THE BRITISH ASSOCIATION.

ALTHOUGH the number of members present at Glasgow was much smaller than was expected, the attendance at the meetings of Section A was well maintained. The papers presented to the Section were unusually numerous, and endeavours had to be made to restrict each speaker to the twenty minutes allowed by the rules of the Section. These endeavours were not always successful, and several papers which came late in the programme had to be given in too condensed a form to be properly appreciated. This was the case, unfortunately, with the "Note on the Theory of the Michelson-Morley Experiment," communicated by Principal Hicks. Prof. Morley, who was present, did not feel justified in discussing the question without having further details from Dr. Hicks. It is to be hoped that the debate which arose after the meeting of the Section was over, will lead to a repetition of these important experiments in the light of the new theory.

As in former years, the discussions which took place in the Section, either impromptu or by arrangement, formed some of the most interesting items of the proceedings. That on the magnetic effects of electrical convection was opened by Dr. Cremieu with a description of his experiments, all of which gave negative results. Dr. H. A. Wilson pointed out several causes which might possibly account for these results, but subsequent speakers expressed doubts as to them being adequate. On the whole, as Lord Kelvin said, we must wait for a repetition of the experiments under the simplest possible conditions before we accept as final a conclusion against which there is so much indirect evidence, and which, if accepted, would necessitate the entire reconstruction of electromagnetic theory.

A paper by Dr. Guillaume introduced a discussion on the proposed new unit of pressure, the megadyne per square centimetre, which was received with favour by the Section. It is very nearly the pressure exerted by a column of mercury 75 cms. long, at 0° C., at sea level in latitude 45°, and differs therefore little from the atmospheric unit at present used. Dr. Guillaume does not propose to interfere with the thermometric scale, and it seemed to be the opinion of the Section that when any change in the scale is made it should be "rationalised," and for convenience have a degree more nearly equal in length to a Fahrenheit than to a Centigrade degree. The discussion opened by Dr. Glazebrook was to have been on glass used for all scientific purposes, but on account of the small time at his disposal he had to restrict his remarks to optical glass, and gave an account of the advances made by Abbé and Schott in the construction of glass having the optical properties necessary for producing achromatic objectives. During the discussion it was pointed out by Mr. Hinks that the durability of some of the new glasses left something to be desired, one of the lenses in use at Cambridge having become partially covered by a fungus the removal of which would necessitate the taking apart of the objective.

Several of the reports of committees contained matter of special interest. That of the Electrical Standards Committee included the results obtained by Mr. S. Skinner on the slight difference of the amounts of silver deposited by the same current from solutions of silver nitrate in water and in pyridine. The Seismological Committee finds that the wind accounts for certain frequent small movements of the seismograph trace whose source had hitherto escaped detection. The report of the Committee on Underground Temperature contained tables of observations of temperature made in Michigan and in Silesia, down to depths of about 2000 metres. It seems, however, of little value to publish such tables without information as to the nature of the strata met with at different depths. The report of the Committee on the Determination of Magnetic Force on board Ship consisted of Captain Creak's description of the modified dip circle he has devised for carrying out the determination by Lloyds' method. The tests of the instruments having proved them satisfactory, two have been sent out in the *Discovery*, and one in the German ship *Gauss*, for use in the Antarctic.

Of the ordinary communications, that by Lord Kelvin on the absolute amount of gravitational matter in any large volume of interstellar space probably attracted the largest audience. Lord Kelvin gave a *résumé* of the arguments he brought forward in the *Philosophical Magazine* for August, to show that if 25 million years ago 1000 million masses equal to that of our sun had been distributed through a sphere of radius 3×10^{16} kilometres they would have now acquired velocities about equal to those known to be possessed by the stars visible to us. It seems, therefore, probable that the total amount of gravitation matter of our universe does not differ greatly from that of 1000 million suns. The same line of argument may be carried out for the mass distributed as atoms initially throughout space, and we then have the nebular hypothesis reduced to atomic dynamics.

Prof. Gray gave an account of the work he is doing in conjunction with his pupils on the viscosities of liquids and solids and the effect on them of changes of temperature, magnetisation, &c. Some of the most interesting of the results obtained were communicated to the Royal Society in June, and the experiments seem likely to have an important bearing on molecular theory. Dr. J. T. Bottomley's paper on radiation of heat and light from a heated solid was taken at the end of a sitting and received scant attention considering the importance of the subject. Dr. Bottomley finds by measuring the power absorbed by electrically heated polished or blackened platinum wire and strips placed in vacuo, that at the same temperature the blackened radiates four or five times as much energy as the polished surface, and that when the luminous appearance of the two is the same their temperature is practically the same. Prof. Morley and Mr. Brush have been determining the influence of water vapour on the energy lost by a heated body placed in an enclosure containing air, hydrogen or water vapour. At low pressures water vapour transmits heat more rapidly than air, but not so rapidly as hydrogen. In this connection Prof. Morley has devised a new pressure gauge capable of measuring pressures down to about a ten-thousandth of a millimetre of mercury. It consists of a U-tube containing mercury, on one of the free surfaces of which the pressure to be measured acts. The depression produced is measured by the amount of tilt of the tube necessary to bring the two mercury surfaces back into contact with two platinum points in the tube. A complete account of the arrangement is to appear shortly in the *American Journal of Science*.

Prof. Callendar communicated the results of applying a small correction hitherto thought negligible to the values of the specific heat of water between 0° and 100° C., determined from the observations of Dr. Barnes with Callendar's apparatus. The high degree of accuracy which Mr. E. H. Griffiths has attained in measuring temperature by the platinum thermometer has enabled him to determine the depression of the freezing points of extremely dilute solutions, and as a result he can now state that the depression produced by dissolving one gram-molecule of potassium chloride in a thousand grams of water is, to about one part in two thousand, double that produced by the solution of one gram-molecule of sugar.

Mr. B. Hopkinson brought forward a new argument for the existence of an ether. Although at certain times the two stars of a spectroscopic binary are moving in opposite directions at right angles to the line of sight with great velocities, the doubling to be expected, if aberration is due to relative motion of source and receiver, has never been observed. Aberration must then be due to the motion of the receiver with respect to something not matter, and be unaffected by relative motion of this something and the source. This "something" is the ether. Dr. Johnstone Stoney was unable to attend the meeting,